

APPENDIX I

to

Specifications for the Protection
of Naval Aircraft and Parts

21. Specifications for Protective Coatings
22. Specifications for Cleaning Materials
23. Specifications for Ingredient Materials
24. Specifications for Processes
25. Technical Orders, Notes and Letters

21. SPECIFICATIONS FOR PROTECTIVE COATINGS

Compound, Dope, Enamel, Lacquer, Paint, Primer, Solvent,
Thinner and Varnish

<u>Specification Number</u>	<u>Title</u>
C-47c	Compound, Soya Bean Oil
C-71-1	Compound, Liquid Wax, Self-Polishing, Waterproof
C-88	Compound, Beeswax and Grease
D-12g	Dope, Nitrocellulose, Clear
D-13f	Dope, Nitrocellulose, Orange Yellow
D-15d	Dope, Nitrocellulose, Clear
D-16d	Dope, Nitrocellulose, Pigmented
D-23a	Dope, Cellulose Acetate, Clear
D-24a-1	Dope, Cellulose Acetate, Pigmented
E-5d	Enamel, Glyceryl Phthalate, Aircraft
E-6e	Enamel, Black, Glyceryl Phthalate
L-8g-1	Lacquer, Nitrocellulose, Naval Aircraft
L-12a-1	Lacquer, High Resin, Phthalate
M-364	Compound, Phosphate Coating
P-21d	Paint, Bituminous, Coal Tar Pitch Base
P-22c	Paint, Bituminous, Coal Tar Pitch Base (Blended Type)
P-27b-1	Primer, Zinc Chromate, Naval Aircraft
P-37-1	Paint, Dope-Proof
RM-61b	Paralketone
S-60b	Solvent, Nitrocellulose Dopes and Lacquers

Specification
Number

T-25d	Thinner, Nitrocellulose Dopes and Lacquers
T-29b-1	Thinner, Nitrocellulose Dopes and Lacquers, Blush Retarding
T-61	Thinner, Cellulose Acetate Dope
T-62b	Thinner, Toluene Substitute
V-10a-1	Varnish, Naval Aircraft Spar
V-11a	Varnish, Spar, Glyceryl Phthalate, Aircraft
V-13b	Varnish, Naval Aircraft Seam Compound
ST-15d-2	Inspection of Organic Protective Coatings for Aircraft

Title

22. SPECIFICATIONS FOR CLEANING MATERIALS

<u>Specification Number</u>	<u>Title</u>
C-67b	Compound, Paint-Stripping (Silicate Type)
C-86	Compound, Engine Cleaning and Paint Stripping (Cresol Type)
M-354	Metal Cleaner, Silicate Soap
M-355	Stripping Agent, Phenolic Amine Base
M-360	Paint Remover
M-363	Polyether, Phenyl Sulfonate Sodium Salt (For General Cleaning)
5LS3f	Soap, Olive Oil-Soda (Castile)
RM-70	Ether, Alkylated, Phenolic
AN-O-T-631	Trichlorethylene, Stabilized

29.

SPECIFICATIONS FOR INGREDIENT MATERIALS

<u>Specification Number</u>	<u>Title</u>
C-55	Cadmium Oxide
AN-O-A-81	Acid, Chromic
AN-O-Z-361	Zinc Cyanide
AN-QQ-A-671	Anodes, Cadmium
AN-QQ-A-686	Anodes, Zinc
52B4c	Beeswax
RM-1d	Cellulose Nitrate
RM-3a	Cellulose Acetate
RM-4a	Ethyl Cellulose
RM-5b	Cellulose Acetobutyrate
RM-11b	Oil, Linseed, Raw
RM-20a	Dibutyl Phthalate
RM-21a	Glycol Sebacate
RM-22	Dibutyl Tartrate
RM-23	Diethyl Phthalate
RM-24-1	Tricresyl Phosphate
RM-25	Triphenyl Phosphate
RM-31-1a	Resin, Glyceryl Phthalate
RM-32-1	Resin, Phenol-Formaldehyde
RM-44b	Butyl Alcohol, Normal
RM-45a	Amyl Alcohol
RM-46c	Diacetone Alcohol
RM-50d	Ethyl Acetate
RM-52a	Butyl Acetate

RM-55a	Amyl Acetate
RM-57a	Ethyl Lactate
RM-58	Butyl Lactate
RM-60	Methyl Ethyl Ketone
RM-61b	Paralketone
RM-75a-1	Triethanolamine
RM-76	Tertiary Phenolic Amine
RM-77	Alkylated Tertiary Phenolic Amine
RM-80b	Ethylene Glycol Monoethyl Ether
RM-81a	Ethylene Glycol Monomethyl Ether
RM-82a	Diethylene Oxide
RM-84	Diethylene Glycol Monoethyl Ether
RM-85	Diethylene Glycol Monobutyl Ether
RM-93c	Dipentine
RM-101a	Petroleum Naphtha Diluent
RM-103b	Mineral Spirits
RM-104	Hydrogenated Petroleum Naphtha
RM-105	Coal Tar Naphtha
RM-106	Aromatic Petroleum Naphtha
RM-107	High Aromatic Naphtha
RM-111c-1	Toluene (Toluol)
RM-112d	Xylene (Xylol)
RM-120a	Driers, Naphthanate, Concentrated, Liquid
RM-130-4b	Titanium Oxide
RM-130-5	Antimony Oxide
RM-131-1b	Carbon Black

Bronze Milori Blue	RM-132-1a
Copper Phthalocyanine Blue	RM-132-2
Toluidine Red	RM-133-2b
Cadmium Red	RM-133-3a
Lead Chromate	RM-135-1b
Zinc Chromate	RM-135-5c
Cadmium Lithopone	RM-135-6
Chrome Green, Extra Light	RM-136-2a-1
Aluminum Pigment	RM-137-1
Sodium Metasilicate	RM-140
Soluble Sodium Trisilicate Powder	RM-141
Acid Oleic	RM-150
Cresol	RM-151
Potassium Nitrate	RM-160

24.

SPECIFICATIONS FOR PROCESSES

<u>Specification Number</u>	<u>Title</u>
M-289a	Metal Spraying
AN-QQ-P-421	Plating, Cadmium
46P1	Plating, Cadmium
PP-1b	Plating, Cadmium
PF-11	Plating, Chromium
P-44	Plating, Chromium
SN-1	Plating, Nickel
P-46	Plating, Nickel
PC-12	Plating, Tin
46P2	Plating, Zinc
PC-9	Plating, Zinc
PD-2	Application of Series D-12 and D-13 Dopes to Fabric Surfaces
PF-2-1	Preparation of Faying Surfaces and Fastenings
PF-6	Painting of Special Aircraft
PF-9b	Use of Zinc Chromate Primer
PR-2	Rejuvenation of Doped Fabric Surfaces
PS-5	Sand Blasting Metal Parts
PT-13d	Protective Treatment of Magnesium Base Alloys
M-303a	Chrome Pickle Treatment of Magnesium Base Alloys
M-382	Modified Chromate-Alkali Treatment of Magnesium Base Alloys
ER-2a	Naval Aircraft Insignia and Marking

Report No. M-4098

SR-19e	Protective Treatment of Aluminum and Aluminum Alloys by Anodic Oxidation Process
SR-70a	Application of Protective Coatings to Fabric Surfaces of Aircraft
ST-15d	Inspection of Organic Protective Coatings for Aircraft
AN-QQ-S-91	Salt Spray Corrosion Test; Process for
M-364	Compound Phosphate Coating

25. TECHNICAL ORDERS, NOTES AND LETTERS

TO	34-36	Generation of Static Electricity in Painting
TO	4-37	Mechanical Abrasion of Anodic Film on Aluminum Alloy
TO	50-38	Painting and Doping of Airplane Wings
TN	21-35	Prevention of Corrosion on Seaplanes
TN	33-38	Paralketone Compounds for Corrosion Prevention
TN	43-38	Protection of Fabric Surfaces Against Fire from Sparks

Seven bureau joint letter (Aero.L5-1-LR) of 28 October 1935 - Instructions to Inspectors of Naval Material.*

Aer-E-25-SG/F38/F38-3 of 17 June 1937 - Organic Protective Coatings for Aircraft.*

Aer-E-252-RL/F-38 of 19 September 1935 - Procurement and Inspection of Aircraft Finishing Materials.*

Aer-E-25-FAM/F38 of 16 November 1936 - Proprietary Protective Coating Materials.*

Aer-E-253-VB/JJ52A1/F38-3 of 26 April 1938 - Aluminum Pigment.#

Aer-E-25-SG/F38-3/JJ52A1 of 7 April 1937 - Aluminum Finish for Aircraft.#

Aer-E-253-VB/F38-2(5) of 24 September 1938 - Compounds for Cleaning Metal and Stripping Paint.#

Aer-E-252-HY/F38-2(6) of 28 March 1939 - Zinc Chromate Paste.#

Aer-Ma-5-REM/L11-1(3)/N5 of 11 June 1936 - Fire Precautions in Dope Shops and Doping Spaces.#

Note: Those letters marked * are of interest primarily to inspection offices and are not available for outside distribution. The letters marked # are of interest primarily to service activities and airplane contractors, but not to manufacturers generally. The supply of these latter letters is limited and it is requested that requests of manufacturers and contractors for information be answered by extracting pertinent data from the applicable letter if it is on file

APPENDIX III

to

Specifications for the Protection
of Naval Aircraft and Parts
Airplane Model No. N3N-3

Submitted for

Information for Approval of Design

on

Project Order No. 58-40

Project Order No. 117-40

Number of Airplanes on P.O. 58-40 (50)

Number of Airplanes on P.O. 117-40 (100)

Serial Numbers of Airplanes on P.O. 58-40, 1759 - 1808 incl.

Serial Numbers of Airplanes on P.O. 117-40, 1908 - 2007 incl.

This Report No. M-4098

Date of Report - 6 March 1940

This Appendix Report is submitted in accordance with the Contract Requirements of Specification SR-15c. All of the requirements of this specification are to be complied with except as may be specifically set forth herein

APPENDIX III

PART TWO

PRODUCTION SPECIFICATION FOR PROTECTION AND FINISH

5. GENERAL REQUIREMENTS

- ** 5.1 Production Processes.- The following description of protective processes for aluminum alloy material is set forth and is the contractor's method of line production work.
- ** 5.11 Tank for Cleaning Prior to Anodizing.- Trichlorethylene (stabilized) Specification AN-O-T-631 is used.
- ** 5.12 Not applicable.
- 5.13 Tank for Anodizing.- Chromic acid 3 percent to 10 percent with pH control.
- 5.14 Tank for Rinsing.- Clear hot water.
- ** 5.15 Not applicable.
- ** 5.16 Space for general inspection will be provided.
- ** 5.17 Not applicable.
- ** 5.18 The processes involved in the above shall consist of air drying the parts when removed from the final rinse tank. While still attached to the racks the material should then be conveyed on padded trucks to the inspection benches. It is essential that the material be handled at this stage with rubber gloves. Immediately after inspection the material shall receive a coat of chromate primer.
- ** 5.19 Consideration should be given to the handling of ferrous material so that it will flow parallel to and into the above process.
- ** 5.2 Cleaning Prior to Surface Treatment.- All parts shall be carefully cleaned immediately prior to anodizing or other inorganic surface treatment. Trichlorethylene (stabilized) is used. Hot rinsing shall follow cleaning.
- 5.3 Inorganic Surface Treatment.

5.31 Anodizing Aluminum Alloys.- All aluminum alloy parts or surfaces shall be given anodic treatment in accordance with the current issue of Specification SR-19 unless otherwise specified. In general, the anodic treatment shall be applied to parts prior to assembly. However, disassembly for the purpose of anodic treatment of the separate components is not required when these conditions are met: (a) the assembly is so situated in the structure as not to come in direct contact with salt water or where the possibility is remote that salt water or spray will enter or remain due to lack of free drainage; (b) no dissimilar metals form a part of the assembly; (c) the assembly is an integral unit in the structure not subject to breakdown or disassembly in service; (d) waterproofing or insulating fabric or compounds subject to deterioration in the acid bath are not a part of the assembly and (e) the final organic protective coating forms a continuous unbroken film. These instructions shall not be construed as to permit the omission of the protective anodic film on faying surfaces where moisture may gain entry and be retained by capillary action. Experience shows these surfaces in structures appear to be most liable to corrosion and it is at these points that the maximum protection should be afforded. Examples of the latter are faying surfaces in external float plating, and internal faying surfaces between float stiffeners and bottom plating. When advantage is taken of the foregoing waiver of anodization of parts prior to assembly, the priming coat shall be applied to the assembly immediately after anodizing.

5.311 The maximum protection by anodic film shall be secured by performing as much work, such as cutting, drilling, forming, etc., as is practicable, prior to anodizing and assembling parts. The drilling of rivet or bolt holes is permissible in anodically treated parts without subsequent re-anodization, in cases where extensive disassembly work is involved in the manufacture, and where the parts are sufficiently sealed against moisture by application of the organic finish coating, and remain as an integral structural unit not subject to disassembly in service. Examples illustrating the foregoing are the drilling of rivet holes for the purpose of assembling anodically treated bulkhead plating to the stiffening members, and anodized skin plating to float framework.

5.32 Not applicable.

5.33 Electro-Plating.- All steel parts except as herein indicated, shall be cadmium plated. All welding shall be done prior to plating. The plating shall be uniform in thickness, possess good adhesion and the quality shall be such as to withstand a continuous 250 hour 20 percent salt spray test without signs of rust appearing. The Inspector shall periodically select random samples from production work, submit them to test or forward them to the Naval Aircraft Factory to determine compliance with the foregoing requirement. Brass, bronze and copper parts in contact with dissimilar metals shall be similarly plated. Exceptions to the above follow:

5.331 Parts manufactured of corrosion resistant steel.

I N D E X

1. APPLICABLE SPECIFICATIONS AND INSTRUCTIONS.
 - 1.1 Applicable Specifications.
 - 1.2 Appendix I.
 - 1.3 Precedence.
2. GENERAL INSTRUCTIONS TO CONTRACTORS.
 - 2.1 Appendix II.
 - 2.2 Appendix III.
 - 2.3 Precedence.
 - 2.4 Drawings.
 - 2.5 Drawings vs Specifications.
3. MATERIAL AND WORKMANSHIP.
 - 3.1 Quality of Materials.
 - 3.2 Work Done Prior to Material Inspection.
 - 3.3 Workmanship.
 - 3.4 Guarantee.
4. DESIGN CONSIDERATIONS OF PROTECTION.
 - 4.1 Free Drainage.
 - 4.2 Seams.
 - 4.3 Dissimilar Metals.
 - 4.4 Heat Treatment.
 - 4.5 Exhaust Gases.
5. GENERAL REQUIREMENTS (APPENDIX III).
 - 5.1 Recommended Production Process.
 - 5.2 Cleaning Prior to Surface Treatment.
 - 5.3 Inorganic Surface Treatment.
 - 5.31 Anodizing Aluminum Alloys.
 - **5.32 Anodizing Magnesium Alloys (Not applicable).
 - 5.33 Electroplating.
 - 5.34 Metal Spraying.
 - 5.4 Cleaning After Surface Treatment.
 - 5.5 Cleaning Prior to Finishing Applications.
6. APPLICATION OF ORGANIC COATING MATERIALS.
 - 6.1 Condition of Surfaces.
 - 6.2 Air or Weather Conditions, Drafts.
 - 6.3 Preparation of Materials.
 - 6.31 Mixing Aluminum Pigment.
 - 6.32 Choice of Thinners.
 - 6.4 Film Thickness.
 - 6.5 Drying Conditions and Film Thickness vs. Drying Time.
 - 6.6 Dipping Preferred Application Method.

NOTE:

All paragraphs marked ** are not applicable or differ from Bureau of Aeronautics Specification SR-15C.

INDEX (Continued)

- 7. DETAIL REQUIREMENTS FOR FINISHING SYSTEMS.
 - 7.1 Organic Protective Systems.
 - 7.2 Shop Primer Coat Required.
 - 7.3 Detail Protective Schedules.
 - 7.31 Class AA for Special Conditions or Material.
 - 7.32 Class A or Three Coat Protection.
 - **7.33 Class B or Two Coat Protection (Not applicable).
 - **7.34 Class C or One Coat Protection (Not applicable).
 - 7.35 Class D or Surface Treatment Only.
 - **7.36 Convertibles (Not applicable).
 - 7.37 Alclad.
 - 7.4 Rivet Heads.
- 8. SPECIAL REQUIREMENTS FOR CORROSION PREVENTION.
 - 8.1 Free Drainage.
 - 8.2 Faying Surfaces and Seams.
 - 8.21 Faying Surfaces.
 - 8.22 Seams, General.
 - 8.23 Seams, Floats and Hulls.
 - 8.24 Seams, Watertight.
 - **8.25 Seams, Gasoline (Not applicable).
 - 8.3 Dissimilar Metals, Insulation of
 - 8.4 Heat Treatment.
 - 8.5 Surfaces Exposed to Exhaust Gases.
- 9. ELECTRICAL BONDING.
 - 9.1 General.
 - 9.2 Dissimilar Metal Connections.
 - 9.3 Electrical Conduit.
 - 9.4 Protection of Bonding Connections.
- 10. GENERAL PRECAUTIONS.
 - 10.1 Metal Particles.
 - 10.2 Steel Wool, Use of.
 - 10.3 Leather, Use of.
 - 10.4 Tie Rods.
 - 10.5 Wrapping.
 - 10.6 Welding and Soldering.
 - 10.7 Working Surfaces.
 - 10.8 Rubber.
 - 10.9 Firewall.
 - 10.10 Drilling and Forming.
- 11. FABRIC SURFACES.
 - 11.1 General.
 - 11.2 Dope Proofing.
 - **11.3 Fire Proofing (Not applicable).
 - **11.4 Fabric Surfaces on Seaplane Rudders (Not applicable).

INDEX (Continued)

- 12. MISCELLANEOUS ITEMS AND REQUIREMENTS.
- **12.1 Magnesium, Additional Protection (Not applicable).
- 12.2 Acid Proofing.
- 12.3 Standard Parts.
- 12.4 Control Cables.
- 12.5 Tanks.
- **12.51 Integral Fuel Tanks (Not applicable).
- 12.52 Non-Integral Fuel Tanks.
- 12.53 Oil Tanks.
- 12.54 Tank Supports.
- 12.6 Tubing.
- 12.61 Structural.
- 12.62 Sealed Steel Structural.
- 12.63 Non-Structural.
- 12.7 Potassium Dichromate, Use of.
- 12.8 Beeswax and Grease, Use of on Seaplane.
- 13. FLOATS.
- 13.1 Extra Inspection Required.
- 13.2 Exterior Finish.
- **13.3 Hull Waterline (Not applicable).
- 13.4 Float Bumpers.
- 14. COLOR SYSTEM.
- **14.1 Service Types (Not applicable).
- 14.2 Training Types.
- **14.3 Utility Types (Not applicable).
- **14.4 Cockpits (Not applicable).
- **14.5 Other Personnel Spaces (Not applicable).
- **14.6 Cargo Spaces (Not applicable).
- **14.7 Structural Spaces (Not applicable).
- 14.8 Walkways, Steps, Handgrips.
- 15. INSIGNIA AND MARKING.

Naval Aircraft Factory Process Specification for
Protective Coatings & Finishes PF-11-3 dated
1 February 1940.

SPECIFICATION
FOR
THE PROTECTION OF NAVAL AIRCRAFT AND PARTS

1. APPLICABLE SPECIFICATIONS AND INSTRUCTIONS

- 1.1 The specifications of the latest issue in effect at date of invitation for bids, which are set forth in the latest issue of Appendix I to this specification, form a part of this specification.
- ** 1.2 The instructions contained in the references, which are set forth in Appendix I to this specification form a part of this specification.
- 1.3 These applicable specifications and instructions, together with the following requirements, supersede all instructions previously issued. These requirements shall be complied with on new construction and in refinishing as applicable, unless otherwise approved by the Bureau of Aeronautics.

2. GENERAL INSTRUCTIONS TO CONTRACTORS

- ** 2.1 Appendix II, Plant Equipment and Process Control.- As the Bureau of Aeronautics is cognizant of the Plant Equipment and Process Control at the Naval Aircraft Factory, this appendix is not submitted.
- ** 2.2 Appendix III, Part Two, Contractor's Specifications for the Protection of Naval Aircraft and Parts.- Attached herewith.
- 2.3 Precedence.- In the case of conflict between the requirements of this specification and the contractor's approved Appendix III, the latter shall prevail, subject to the limitations imposed by paragraph 2.2 above.
- ** 2.4 Drawings.- All drawings will have a coded system indicating various finishes. Specification PF-11-3 dated 1 February 1940 listing these finishes is attached herewith.
- 2.5 Discrepancies.- In the case of discrepancies between the above information shown on drawings and the requirements of applicable specifications, the latter shall prevail.

3. MATERIAL AND WORKMANSHIP

- 3.1 Quality of Materials.- The quality of all materials used in the painting, doping and plating of Naval aircraft parts shall conform to the requirements of the latest specifications issued by the Navy Department, unless otherwise specified. Material shall be subject at any time to such tests as the Inspector may prescribe to determine compliance with the specifications.

3.2 Work Done Prior to Material Inspection.- Any finishing work done before materials are approved by the Inspector will be at the risk of the contractor. If the tests indicate that the material fails to meet the specified requirements in any respect, the lot of material from which the samples were taken shall be rejected and any work accomplished using such material shall be refinished to the satisfaction of the Inspector.

3.3 Workmanship.- When an airplane or part is delivered to the Navy Department, the protective coatings shall be suitable and satisfactory for service. Any unsatisfactory painting, doping or plating done prior to delivery shall be refinished to the satisfaction of the Inspector.

3.4 Guarantee.- If at any time within six months after delivery of the airplane or part, the condition of the finish is found to be defective, the work so condemned shall be corrected as required by the contract under "Correction of Defects".

4. DESIGN CONSIDERATIONS OF PROTECTION

Design considerations in order to improve corrosion problems, as outlined by the Bureau of Aeronautics in Specification SR-15c, will form part of this specification.

4.1 Free Drainage.- Complete consideration shall be given to the problem of free drainage to avoid, wherever practical, water traps which may promote corrosion.

4.1.1 Fuel Tanks.- The fuel tank is designed to ensure complete drainage to sump at the lowest point in the tank.

4.2 Seams.- Careful consideration will be given to the location and arrangement of seams in order to avoid water traps.

4.3 Dissimilar Metals.- The elimination of dissimilar metals in contact has been given careful consideration. Where dissimilar metals are used due to strength requirements, every precaution is being taken to ensure permanently dry contact.

4.4 Heat Treatment.- The requirements of cold quenching in accordance with Specification SR-53 will be strictly adhered to.

4.5 Exhaust Gases.- Careful consideration is being given to eliminating openings that may allow exhaust gases to enter interior structures.

- 5.332 Parts which are welded to unplated structures such as cowlings, supports, etc.
- ** 5.333 Welded structures and hollow parts which cannot be thoroughly cleaned to insure removal of the plating solution.
- 5.334 Cable and parts fabricated from wire.
- 5.335 Portions of members which act as bearings or journals.
- ** 5.336 Springs shall be electroplated. When made of wire 1/4 inch diameter or smaller and flat springs 1/4 inch or less in thickness they shall be baked for three hours at 400 degrees Fahrenheit, immediately after plating to eliminate embrittlement. Exposed steel springs shall be painted, using proper class finish specified in paragraph 7.32. Small springs shall not be cleaned by sand blasting.
- 5.34 Metal Spraying.- Where specified, metal spraying shall be applied to carefully and freshly sand blasted surfaces in accordance with the latest applicable process specifications.
- ** 5.4 Cleaning after Surface Treatment or Prior to Paint Priming.- Where the requirements of paragraph 5.1 are met, cleaning is undesirable at this stage. However, in such cases, where there is an appreciable delay between anodizing or other inorganic surface treatment and application of priming coats the material shall be cleaned and dried to insure against contamination resulting from this delay. Trichlorethylene (stabilized) is used.
- ** 5.5 Cleaning Primed Surfaces after Fabrication and Prior to Application of Finish Coats.- After fabrication of sub-assemblies and assemblies of previously primed material, these surfaces shall be cleaned in such manner as to be thoroughly degreased, otherwise clean, and without leaving a residue of cleaning material, while at the same time removing a minimum amount of the original primer. Thinner Specification T-25 is used. Care shall be exercised with joints and cleaning materials shall not be admitted to crevices.

6. APPLICATION OF ORGANIC COATING MATERIALS

6.1 Condition of Surfaces.- All surfaces shall be thoroughly cleaned and dry at the time of application of any organic coating. They shall not have been handled by dirty or greasy hands after the final cleaning operation. They shall have been conditioned in an atmosphere of reasonable dryness as to be insured that the surfaces are free from even the slightest traces of moisture.

6.2 Air or Weather Conditions, Drafts.- Organic coatings shall not be applied under unfavorable air conditions. Wherever possible, coatings should be applied in air conditioned rooms containing some super-heat. Coatings shall not be applied where directly exposed to atmospheres of high humidity. In unconditioned spaces, consideration shall be given to the wind direction and coatings shall not be applied under conditions of strong or moist sea breezes.

6.3 Preparation of Materials.- Materials shall be prepared for use under clean conditions with clean equipment. Mixing shall be done under controlled conditions by either weight or volume in such manner as to insure a high degree of uniformity of all materials prepared for use.

**6.31 Mixing Aluminum Pigment.- Aluminum paste is used exclusively.

**6.311 Not applicable.

**6.32 Choice of Thinners.- Thinners used shall be as recommended by the paint manufacturer and in accordance with the latest Bureau Specifications.

**6.4 Film Thickness.- Film Thickness to be within reasonable established limits and shall be controlled.

**6.5 Drying Conditions and Drying Time.- Under no circumstance is the finishing coat to be applied unless the Zinc Chromate Primer has been given the correct drying time as follows.

(a) Lacquer.- Whenever lacquer is used as a finishing coat, the primer shall be allowed to dry from three to six hours (not less than three hours).

(b) Drying time between lacquer coats should be from a minimum of three hours to six hours.

(a) Primer.- Two hour drying time between primer coats is satisfactory.

**6.6 Dipping.- Dipping in order to apply organic protection is used in all cases where economical.

7. DETAIL REQUIREMENTS FOR FINISHING SYSTEMS

**7.1 Organic Protective Systems.- The number of primer and finish coats specified herein is the minimum required. In general all metal parts shall be given at least one coat of primer and two top coats. Refer to paragraph 7.32 for primer and top coats to be used.

7.2 Shop Primer Coat Required.- After inorganic surface treatment, all metal surfaces, except those under paragraph 7.35 shall receive a shop primer coat. This shall be applied without unnecessary delay. After shop fabrication is completed, this coat shall be thoroughly cleaned as specified under paragraph 5.5, retouched as necessary and may then serve as a first coat of the following schedules.

7.3 Detail Protective Schedules.-

**7.31 Class "AA" - Special Protection.- In special cases additional

protection (as specified elsewhere in this specification) is applied over regular finishes listed in paragraph 7.32.

- ** 7.32 Class "A" or Three-Coat Protection shall be applied to parts listed below.
 - (1) One coat Zinc Chromate Primer (Spec. P-27) and two coats of Aluminum Lacquer Enamel (Spec. L-12).
 - (2) One coat Zinc Chromate Primer (Spec. P-27) and two coats Orange Yellow Lacquer Enamel (Spec. L-12).
 - (3) One coat Zinc Chromate Primer (Spec. P-27) and two coats Aluminum Pigmented Zinc Chromate Primer (Spec. P-27).
 - (4) One coat Zinc Chromate Primer (Spec. P-27) and two coats Gloss Black Lacquer Enamel (Spec. L-12).
- ** 7.321 All exterior metal surfaces of the entire airplane shall be finished Class A-2 except the landing gear and float installations, which shall be finished Class A-1.
- ** 7.322 Interior of fuselage below floors and inaccessible parts of fuselage shall be finished as specified in paragraph 7.329A.
- ** 7.323 Interior of main float and wing tip floats shall be finished Class A-3.
- ** 7.324 Interior of tail surfaces shall be finished Class A-3. Refer to paragraph 11.2.
- ** 7.325 Interior of wings and ailerons shall be finished Class A-3. Refer to paragraph 11.2.
- ** 7.326 Exterior of all struts and structural tubing shall be finished as noted in this specification, using proper class specified in paragraph 7.32.
- ** 7.327 Interior of cowling shall be finished as specified in paragraph 7.329A.
- ** 7.328 Fuel tank area in contact with straps, refer to paragraph 7.338.
- ** 7.329A The entire fuselage structure, fuselage fairing, interior surfaces of all cowling including engine cowling, fuselage cowling (fixed or removable), firewall, floors and the engine mount shall be finished Class A-1. Refer to paragraph 11.2.
- ** 7.329B Seats, rudder pedals, elevator and aileron controls (interior) elevator tab controls, power plant controls, brake controls and the tail wheel lock control shall be finished Class A-4.
- ** 7.329C Instrument Boards.- The forward face of the instrument board to be finished with crystalline black enamel, except reflecting

Report No. M-4098

surface for indirect lighting which is to be finished with white lacquer, Specification L-12.

- *7.33 Not applicable.
- *7.331 Not applicable.
- *7.332 Not applicable.
- *7.333 Not applicable.
- *7.334 Interior of struts, structural tubing shall be finished as specified in paragraphs 12.61 and 12.62.
- *7.335 Not applicable.
- *7.336 Exterior of non-structural tubing shall be finished to match adjacent structure, using proper class specified in paragraph 7.32.
- *7.337 Paying Surfaces.- Refer to paragraph 8.
- *7.338 Exterior of fuel tank shall be finished Class A-1.
- *7.339 Not applicable.
- *7.34 Not applicable.
- *7.341 All Alclad surfaces shall be finished, using proper class in paragraph 7.32.
- *7.342 Interior of non-structural tubing which is open (except airspeed meter tubing) shall be finished same as outside of tubing.
- *7.343 The interior of the fuel tank shall have no paint finish. Refer to paragraph 12.52.
- *7.35 Class "D" Protection or Surface Treatment Only.- Shall be applied to parts as follows:
 - *7.351 Interior of non-structural aluminum alloy tubing employed in closed system. Refer to paragraph 12.63.
 - *7.352 Corrosion resistant steel parts shall have no paint finish, except as otherwise specified.
- *7.36 Not applicable.
- *7.37 Alclad.- Refer to paragraph 7.341.
- *7.4 Rivet Heads.- Rivets need not be primed before driving but shall be cleaned and neatly touched up or sprayed with a shop priming coat after driving. This requirement may be modified by the Inspector as may be necessary to provide for rivet inspection and as necessary to avoid slowing

down manufacturing processes. Special attention shall be given to the cleaning of rivet heads.

8. SPECIAL REQUIREMENTS FOR CORROSION PREVENTION

8.1 Free Drainage.- A special inspection shall be made of the airplane, primarily from the standpoint of its attitude at rest, but also considering its attitude in flight, to determine that every possible pocket, large and small, is provided with a means of complete drainage. This inspection shall be made at such times during process of construction and repeated as necessary to insure that its purpose is being effectively accomplished. Where necessary, holes shall be drilled of sufficient size that they may be adequately painted without endangering subsequent stoppage. Where drain holes can not be provided for minor pockets, the affected area shall be filled with wax or wax-grease mixtures, or other suitable compounds, such as to insure the elimination of moisture concentration by this method.

8.2 Faying Surfaces and Seams.

** 8.21 Faying Surfaces.- Shall all be painted with a minimum of two coats of zinc chromate primer on each surface regardless of the class of protective schedule used on adjacent surfaces. Where dissimilar metals are involved, additional protection as specified under paragraph 8.3 shall be required.

8.22 Seams, General.- Shall receive careful workmanship to insure fair mating of faying surfaces providing a minimum of non-meeting area. Rivet spacing closer than that required for structural considerations may be required by the Inspector if considered desirable. Where full caulking is not required, organic coatings shall be applied in such manner as to provide caulking and filleting of the edges by this means.

** 8.23 Seams, Floats.- In general, Neoprene (fabric base, adhesive coated) Specification N-9-1 is used as sealing strips for watertight joints. The material which is coated on both sides with a dry adhesive, is activated by kerosene, and is used for cementing the tape to surfaces in order to hold it in place during fabrication. In special cases (such as uneven surfaces) outing flannel, impregnated with soya bean oil, is used.

** 8.24 Seams, Watertight.- The procedure outlined in paragraph 8.23 is used for all seams. In cases where caulking is necessary, lamp-wick, impregnated with soya bean oil, is used.

** 8.25 Not applicable.

** 8.3 Dissimilar Metals, Insulation of.- In all cases where the assembly will permit dissimilar metals shall be insulated by the use of Cambric (Insulating, Varnished) Specification 17C8 (thickness .005). The insulation shall extend approximately 1/4" past the boundary of parts. Where the assembly does not permit the insertion of the insulating material, such as end fittings in struts, the mating

parts shall be set in wet primer. In all cases every precaution shall be taken to insure the presence of the primer on all contacts after assembly and to insure that an absolutely dry contact will be permanently maintained.

8.31 Steel Fasteners through Aluminum Alloy.- In all cases where steel fasteners (exposed to the weather) are used through aluminum alloy, an aluminum washer (1/64 thick) is used under head of bolt, while a standard aluminum alloy washer is used under the nut.

8.4 Heat Treatment.- The requirements of Specification SR-53 shall be strictly followed to obtain the maximum corrosion resistance of aluminum alloy parts.

8.5 Surfaces Exposed to Exhaust Gases.- Where there is a possibility of surfaces being exposed to exhaust gases, these surfaces shall be given extra organic protection.

9. ELECTRICAL BONDING

9.1 General.- The requirements of bonding and the requirements of protection, particularly dissimilar metal insulation, will be in accordance with the Bureau's specifications.

9.2 Dissimilar Metal Connections.- Where dissimilar metal connections are required by bonding, such connection shall not be made to any structural part of the airplane. The design of structures should provide for integral tabs to which bonding connections may be made. If not provided similar metal tabs shall first be attached to a structural member such that when and as corrosion of dissimilar contacts takes place the main structure will not be affected.

9.3 Electrical Conduit.- Electrical conduit need not be painted prior to installation. After installation, the conduit and junction boxes shall receive a finish to match adjacent area. Two coats are sufficient.

9.4 Protection of Bonding Connections.- Bonding connections shall receive a three coat finish.

10. GENERAL PRECAUTIONS

10.1 Metal Particles.- Precautions shall be taken in the fabrication and assembly of materials, particularly such as wing tip floats and other relatively inaccessible sections, to insure that metal particles, particularly of dissimilar character, do not remain lodged behind frames or stringers by becoming partially imbedded in organic coatings.

10.2 Steel Wool, Use of.- The use of steel wool on aluminum surfaces is prohibited. Where used on steel surfaces, it shall be handled with caution and all the particles arising from such use shall be carefully disposed of.

10.3 Leather.- Leather or composition material containing chlorine shall not be used in contact with structural aluminum alloy parts.

- ** 10.4 Tie Rods.-** Tie rods shall be insulated from spreader bars by coating with Paralketone and wrapped with transparent cellulose adhesive tape. Bonds shall be carefully protected with primer and lacquer.
- 10.5 Wrapping.-** The wrapping of structural members to facilitate fastenings shall be eliminated wherever practicable. Wherever it is used, wrapping material shall be non-hygrosopic and otherwise inert. All wrapping applications shall receive the approval of the Inspector. Lower longerons and lower crossed members shall not be wrapped.
- 10.6 Welding and Soldering.-** Welded aluminum alloy parts shall be cleaned in accordance with the current issue of Specification PT-5 as soon as practicable after welding in such manner as to insure complete removal of the welding flux. Welding, soldering or filing shall not be permitted on an assembly after it has been painted without prior approval of the Inspector.
- 10.7 Working Surfaces.-** Special care shall be exercised to ascertain that paint is not applied to working surfaces or to adjustable screw threads, oil holes, etc. Paint shall not be applied to fittings in such manner as may cause bearings to freeze.
- 10.8 Rubber.-** Rubber shall not be painted, greased or oiled.
- ** 10.9 Firewall.-** The firewall and engine structure forward thereof shall receive three coats of paint. Refer to paragraph 7.329A.
- 10.10 Drilling and Forming.-** Precautions shall be taken that the drilling and forming operations on shop primed material avoid scratching, marring or destroying the shop protective coating.
- 11. FABRIC SURFACES**
- 11.1 General.-** Fabric covered surfaces shall be doped in accordance with the latest issue of Specification SR-70 except as specified below.
- ** 11.2 Dope Proofing.-** The dope proofing of metal surfaces in contact with doped fabric is not required as zinc chromate primer or lacquer are the finishing materials. A slight bleeding action of the color of these materials through the fabric on the first coat of dope application is not objectionable.
- ** 11.21 The exterior surface of the fabric covering shall be given the following coatings.**
- ** 11.211 At least four coats of clear nitrate dope (Specification D-15) to obtain proper tautness. The third and fourth coats are applied by hand brushing.**